





## DEVELOPMENT PROGRAMMES AND THE DEMANDS OF THE NEW AGRARIAN REVOLUTION

## MAIZE

MAIZE CROP GEOGRAPHY • THE SPECTACULAR CAREER OF CONSANGUINE HYBRIDS • 3,500 LOCAL STRAINS AND POPULATIONS IN THE FUNDULEA GENE BANK • GENETIC INOCULATION OF ESSENTIAL AMINO ACIDS • OPTIMIZATION OF WATER AND MINERAL SUBSTANCE CONSUMPTION • HYBRIDS SPECIALIZED FOR VARIOUS USES • WILL MAIZE BECOME A PERENNIAL PLANT?

A vegetal miracle: maize. A plant which covers several hundreds of millions of hectares every year and which is known to nearly all the planet's inhabitants. A genuine supercereal capable of amazing us year after year through repeated output records, and on which mankind is pinning its hopes for the future.

As a rule people only know that maize comes from pre-Columbian America. But its origin remains enveloped in mystery, very much like Maya civilization whose name it resembles phonetically in several languages. Many agronomists, historians, botanists, archaeologists etc. strove to separate the various threads that make up the genetic "string" of maize, but many enigmas have yet to be deciphered. Is maize the natural outcome of a natural evolution? Was it developed by man by accidental or expert hybridization? These questions have not yet been offered fully convincing answers.

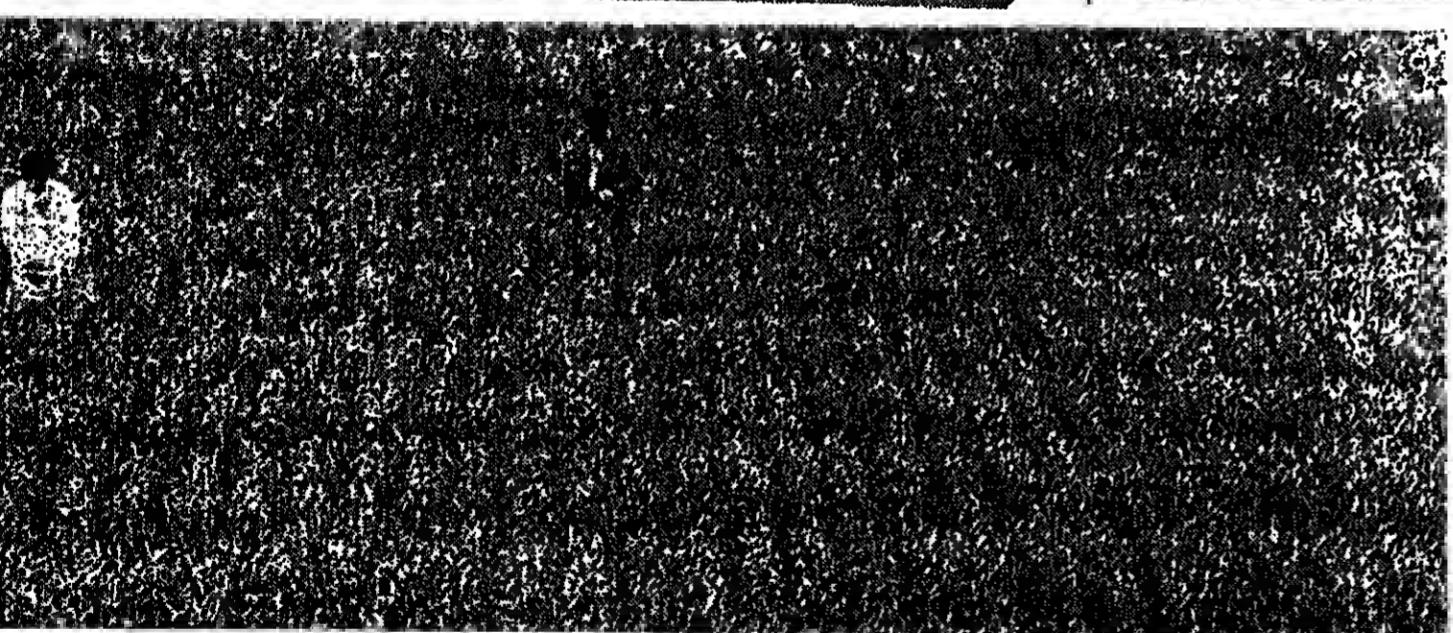
Maize was first cultivated around 4500 BC, as proved by researches conducted in the Mexican cave of Perea. But maize pollen was found as deep as 60 metres underground which, according to glacial chronology suggests that deposit to be 60,000 years old, much older than any farming

pursuit. Even if an ancestor, an alleged "wild maize" plant might have existed, that vegetal form has disappeared without leaving any trace. And if a fantastic scenario of the future omitted, even for one spring, the sowing of maize by man, this widespread plant would become completely extinct. For maize is incapable of ensuring its own survival, as many other vegetal species would do. Maize seeds are trapped in a vegetal prison from which there is now way out: the cob. They do not fall by themselves when they are ripe, nor are they carried by the wind to places where they may germinate spontaneously. Maize's only chance is to be sown and tended by man.

## DOSSIER



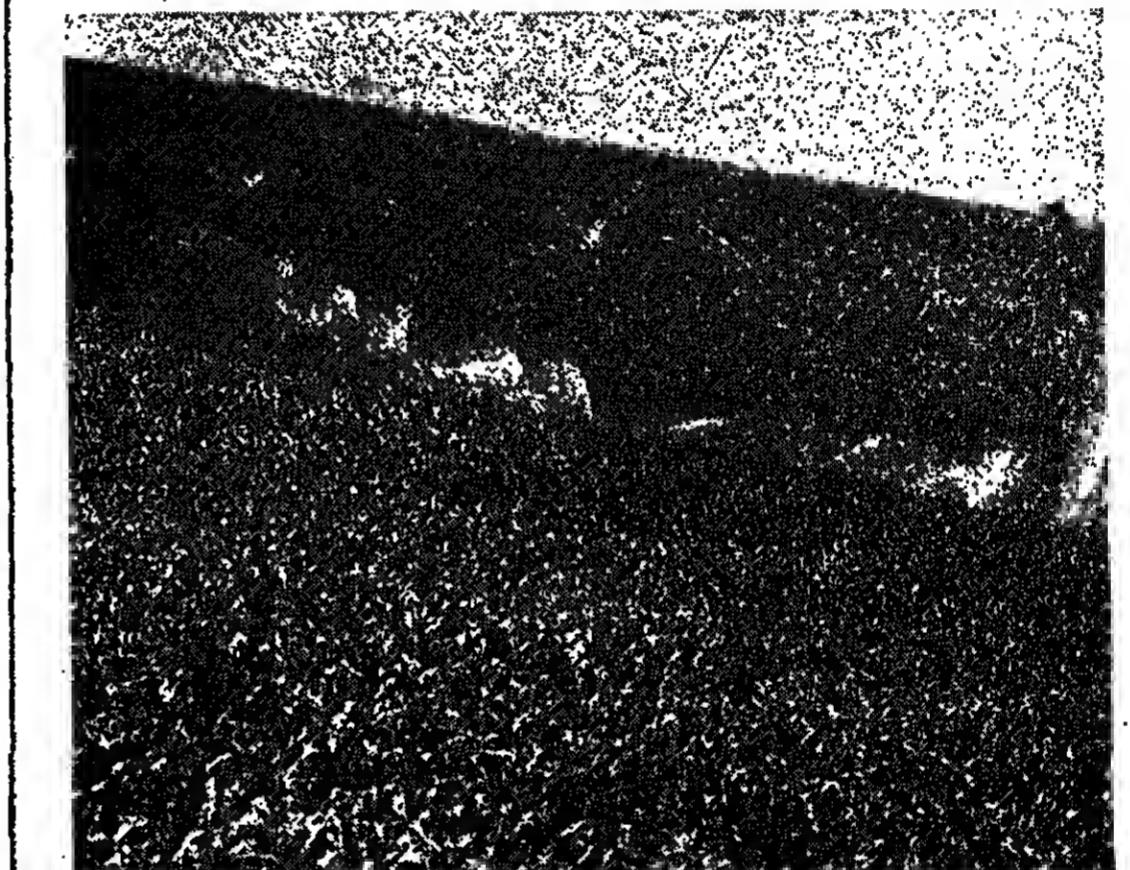
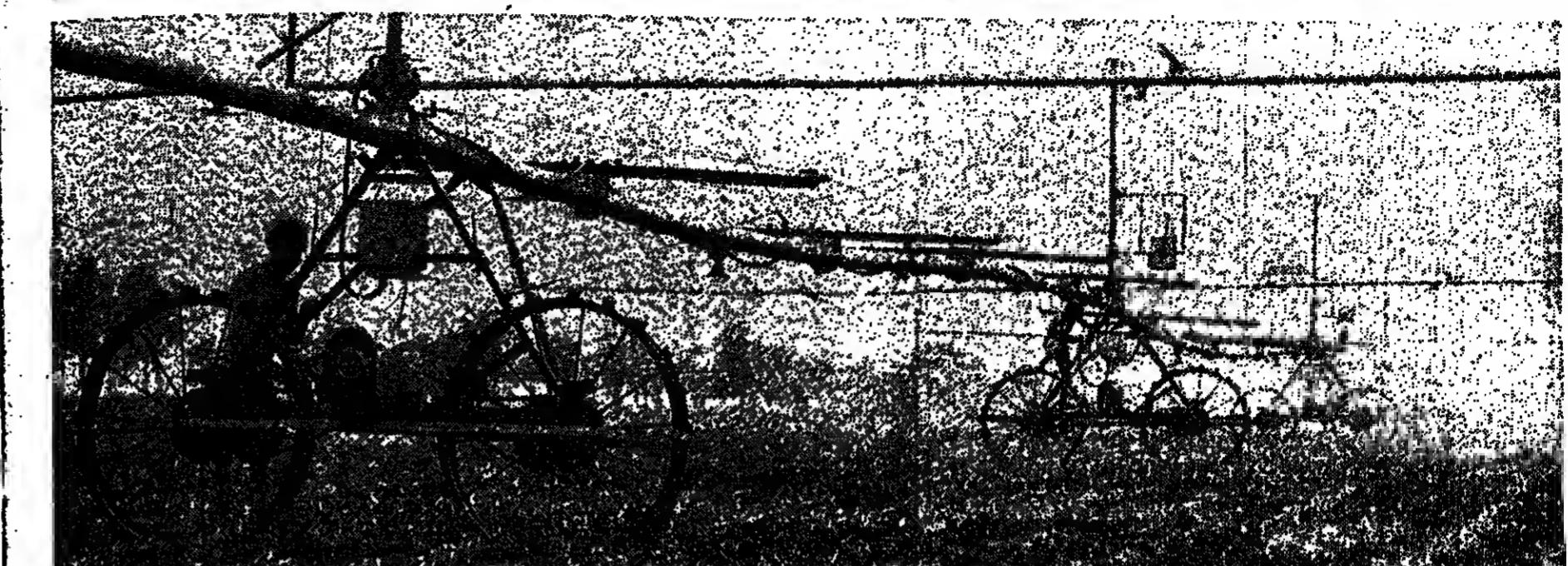
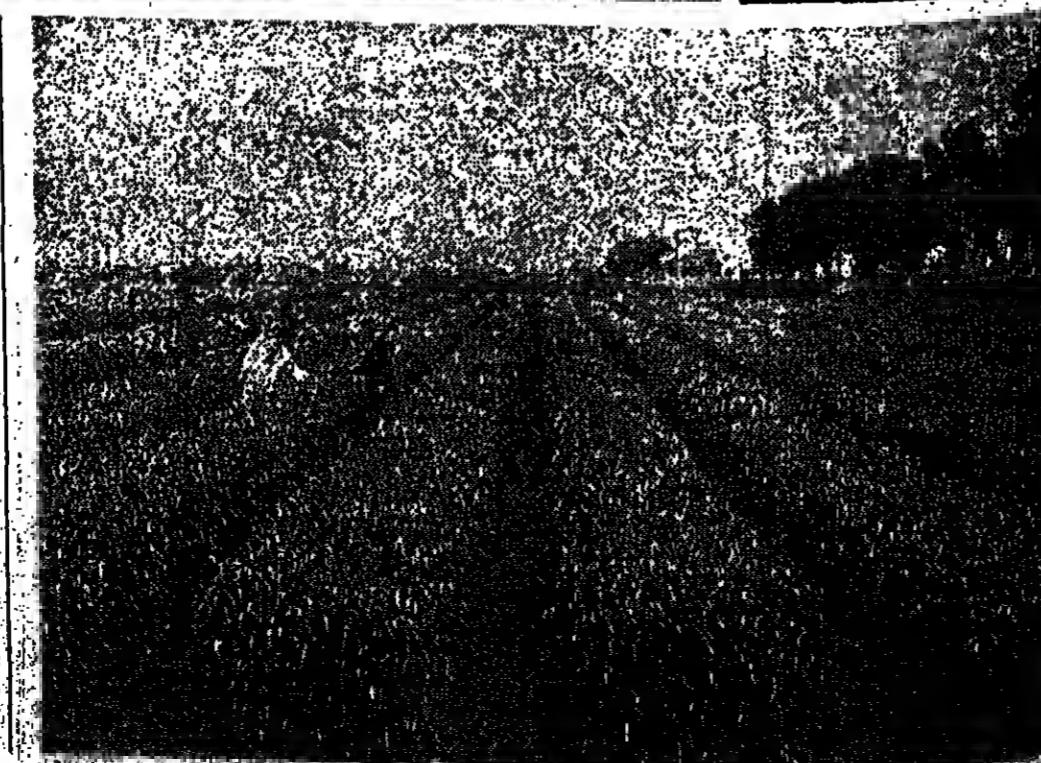
It is harvest time: corn cobs have already been loaded in trucks (top photo, p. 4). But, until reaching this stage, the breeders' knowledge was useful, among other things, for the amelioration of corn varieties. With this purpose, a special research institute was founded at Fundulea, Oltenia county, as early as 1955. We present the specialists' activity in our bottom right photo (in experimental plots) and in the bottom photo on page 5 (in one of the labs). The winter deficit in nature is replaced by ample irrigation systems (photos on p. 5, top and middle).



## A SUPERCEREAL'S CAREER

The plant discovered by the Europeans in the subtropical regions of America spread over a vast geographic area with extremely varied climatic and soil conditions (from 33° N (Canada, the USSR) to 48° S (New Zealand). This highly unusual territorial distribution is explained ecologically by the great biological plasticity of maize. It has adapted to well-drained and climatic conditions of each zone so that it has become almost impossible, accidentally to, enclose all the hybrids and botanical varieties existing on the globe, and their morphological and productive characters.

Romania ranks fourth in the world in concern to her maize growing areas, after the USA, Mexico and the USSR. Maize crops are spread over almost the entire territory of the country. But in this "cereal belt", a chain of highly "unfavourable" regions can be seen, one of the Chapmanian



During the last five centuries maize has become increasingly more important, being the basic cereal in Romanian agriculture. While during the last few decades the areas under maize have manifested a slight tendency to decrease, average output per hectare has grown at a tremendous pace. This is in fact the moment when Romanian agriculture is passing from extensive to intensive-type development. About 30 per cent of the total arable land is devoted to the 100 maize crop at present. Compared to the other cereals, it offers the largest average output per hectare and it holds the largest share of the country's total grain production.

## THE AMELIORATORS' ACTION

A century ago, in 1853, a peasant from Lipova, county, developed the Lipova maize strain by crossing Romanian and American varieties. This strain, imposed itself by large outputs and good adaptability to soil and climatic conditions. The Lipova strain became widespread. It was cultivated for nearly 100 years.

Maize amelioration is an important issue. In Romania, the question of local maize varieties and populations were collected from all the maize growing areas in the country. As a result the gene bank of the Fundulea Institute centralized an important collection of maize strains, some of which are still in use. The Fundulea Institute, in 1955, a research institute specializing in maize growing, was set up at Fundulea, Targoviste, with five other stations (Oradea, Podu Rosu, Gura Muresului, Gura Ardei, Cetatea Aradului) and the National Institute of Agricultural Research and Methodology of Oltenia, respectively, promoted the production of hybrids between the strains of Oltenia.



Amelioration is mechanized operation, high photosynthetic capacity, diversified quality of the grain, superior utilization of the irrigation water and fertilizer, resistance to diseases and pests.

The original varieties used for amelioration were the indigenous free-pollinating varieties and local populations (especially in the 1950-1960 period) brought from New America (Corn Belt), France, Spain, Germany etc. boasting a higher productive potential and output for mechanization.

The elimination from cultivation of the old free-pollinating strains occurred in Romania extremely fast. In just seven years (1955-1962) there was also due to specific conditions (the existence of large state-owned or cooperative farming units, the state policy of continually modernizing agriculture, the close relations between research and production, the presence in the fields of a large number of specialists with adequate technical training etc.)

## PROTEIN RECORDS

Fundulea: F-320, F-375, F-380 and F-420. They have productive potentials of 7.5-15 tons per hectare on unirrigated plots and 9-10 tons of grain when irrigated.

These are probably the most protein-rich than that of the world record is contended by researchers in the much more developed sphere of maize's nutritive qualities.

Although they are not very much like each other, two grains from two different hybrids have different protein contents, of 6.0-6.5 percent.

The Romanian hybrids cultivated at present outperform

(cont. on p. 6)

On the other hand, the foreign hybrids which were used in the beginning proved less adapted to the variations in climatic conditions, especially drought and soaring heat. Their outputs were unstable, often poor and low in protein.

The maize hybrids developed and homologated in Romania rapidly acquired high prestige. They cover now almost the entire cultivated area. Their qualities are precisely indicated by the growing harvest gathered in with every passing year. From an average production of 1.3 tons per hectare harvested over 1941-1955, an average 4.1 tons per hectare were recorded in the 1961-1965 period.

The trials conducted at Fundulea by engineer Saro enabled him to establish the contribution of genetics and breeding to boarlog production per hectare in the 1963-1965 period. Thus, for an annual production of 212 kg per hectare, in the conditions of crop irrigation, genetic progress accounted for 110 kg, that is 52 percent.

(cont. from p. 4)

by a balanced chemical composition. The tests performed by Vitorio Cuzzera show that in most of them the protein content ranges between 11 and 12 per cent. The starch content varies between 60.88 per cent (Lavrini 360) and 73.18 per cent (Fundule 420), and the fat content ranges between 1.60 (diluted frequently re-sorted with moloz 4.1 per cent (F-120) and 5.43 per cent (F-228).

For instance, in comparison to the American Pioneer-type hybrids, the Romanian ones contain more protein and relatively less starch. A team led by Ovidiu Coman has even succeeded in producing consanguine maize lines with a protein content of 13.1 per cent.

Yet the teamwork of research is aimed at two other substances: lysine and tryptophan, two essential amino acids. Their proportion in the maize grain has been concerning farming researchers for several decades now.

In Romania there is a com-

plicated improvement programme aimed at developing hybrids rich in lysine and tryptophan, having a productive potential and agronomic properties similar to those of common maize hybrids.

While HIS 338, a hybrid produced in 1973, yielded output similar to that of the regular varieties under experimental conditions, it behaved poorly on large plots because of certain ecological factors, unsatisfactory climatic conditions. On the contrary, the F 345 (L) hybrid homologated in 1981 is drought- and heat-resistant; it yields 8-9.8 tons per hectare. Its content of protein (11.87 per cent), tryptophan (11.05), lysine (4.41) and fat (5.12) ranks it among the most valuable hybrids in the world.

The recently developed hybrids 114F 2-78 (L) and 114F 815-83 (L) are considered promising because of their high productive potential, high lysine and tryptophan content and resistance to ecological stress factors.

## THE WATER PROBLEM

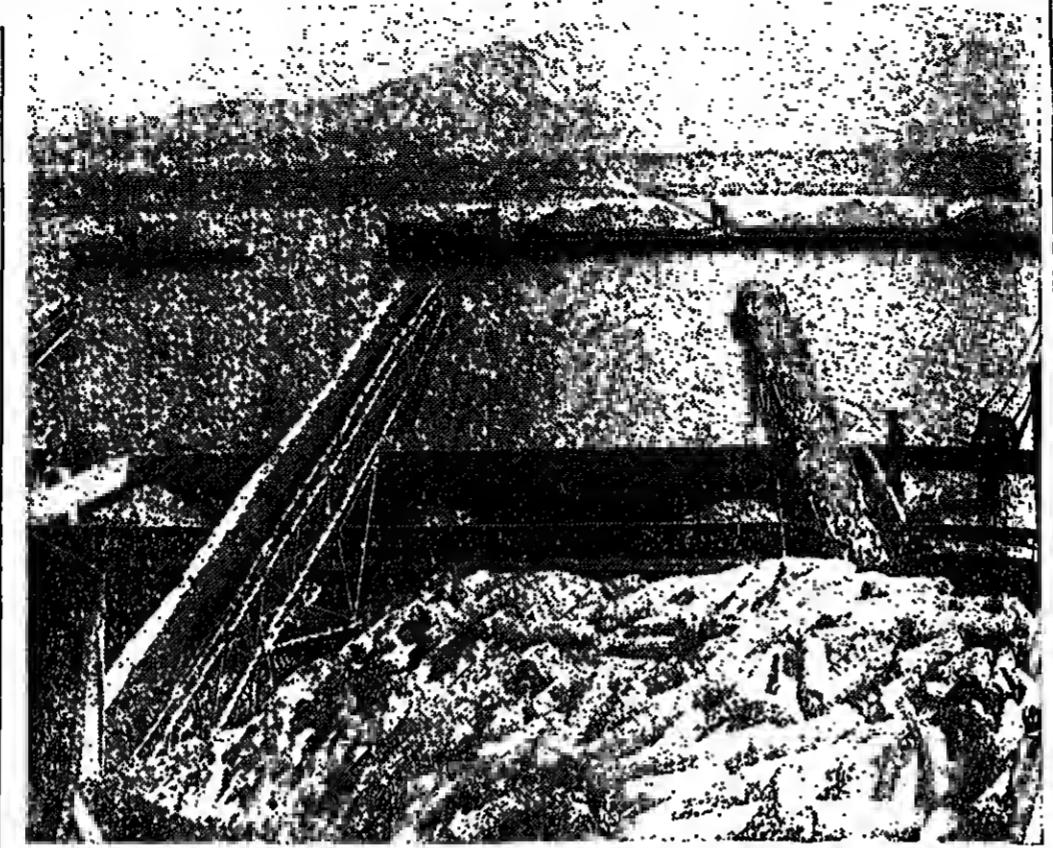
One hectare under moloz consumes anywhere between 4,000 and 5,000 tons of water annually. The largest amounts in our climatic conditions are necessary in July. The F-120 superintensive hybrid for instance consumes 515 tons of water per hectare, in winter 151.8 tons per hectare. In July, this consumption is justified by the productive potential of this hybrid which has a long vegetative period.

Even larger winter consumers are sugar beet, fodder, soybean, wheat etc.

In order to make up for the water deficit often existing in nature during summer months, Romanian agriculture has chosen to lay out immense areas for irrigation. Romania has now nearly four million hectares under irrigation. An ambitious national programme unilaterally coordinates land improvement investments. According to the plan, production some 5 million tons will be irrigated in 2000. Thus harvests will no longer depend on weather's whims and large, safe and stable crops will be ensured irrespective of meteorological conditions.

Naturally in this sphere too the problems are more complex than they seem. There are specialists who monitor the occurrence of critical moments in the water supply of various climatic zones, the possible irrigation periods and zones. Researchers also pursue the maximization of production levels parallel to boosting water utilization efficiency. Thorough researches are also carried on concerning the influence of chemical fertilizers on the production volume and quality. Optimum correlations have been determined between nitrogen, phosphorus and potassium in the mineral nutrition of maize and the influence of each separate element on the quality of the grain protein.

With a view to elucidating certain nutrition problems impossible to solve through classical methods, the nuclear phy-



Corn in various stages of its existence, from harvesting (bottom) to loading on barges.

## THE PLANTS OF THE FUTURE

With a production of 5-8 tons per hectare, therefore less than half the output of F-120, the dilution hybrid F-89 is considered to perform well and to be a success of the Romanian scientists. It imposed itself primarily by its productivity, and only in the second place by its yield per hectare. Thanks to its short vegetative period (under 100 days) F-89 is usually used in double-cropping. It can be sown at the beginning of July after barley harvesting, and it reaches full maturity by October.

F-89 was homologated in 1981 and has since become widespread and replaced almost completely the older F-23 and F-87 single hybrids (1979), which had 'bare' ears proved more productive than the F-89 and F-80 double hybrids.

In fact each homologated hybrid corresponds to a particular need. A first criterion of classifying hybrids would be their vegetative period. In recent years, the latter has no longer been expressed in terms of days but according to a mathematical formula, in terms of the sum of biologically active temperatures. The very maize varieties needed by the predominantly arid areas or those in the north of Romania require that the sum of three temperatures be 1,000°C. For the southern regions (the Danube plain) the sum of biologically active temperatures can reach 1,007°C. However the most unproductive Romanian strain, F-120, does not exceed a necessary 1,000°C.

On the other hand the existence of groups with different maturation ages mows the producers need to phase out both sowing and tending and, her-

vesting operations over many weeks. The situation is also more acute for the large-scale, state-owned estates which in Romanian agriculture, with certain units cultivating over hundreds of thousands of hectares.

There are also maize hybrids diversified according to the utilization. In the last few years several specialized hybrid varieties have been homologated in Romania, having a high yield of high-quality protein, especially standard hybrids 815-83, 114F 814. Grains which are rich in starch, glucose or fat have been produced for industrial use. Botanical terms having starch, protein, and plant pigments rich in vitamin A have been used, as well as to be used as a food. Hybrids with sugar grains such as Galben de Făgăraș and Dăbâca have been homologated for processing. Yet other hybrids are meant for animal feeding, among them the F-114F 811 having a productive potential of 7-8 tons per hectare. Nearly all of them are capable of withstands competitions against the best collections worldwide.

On the other hand, breeders and stations continue to improve the optimum hybrids for each hybrid utilized.

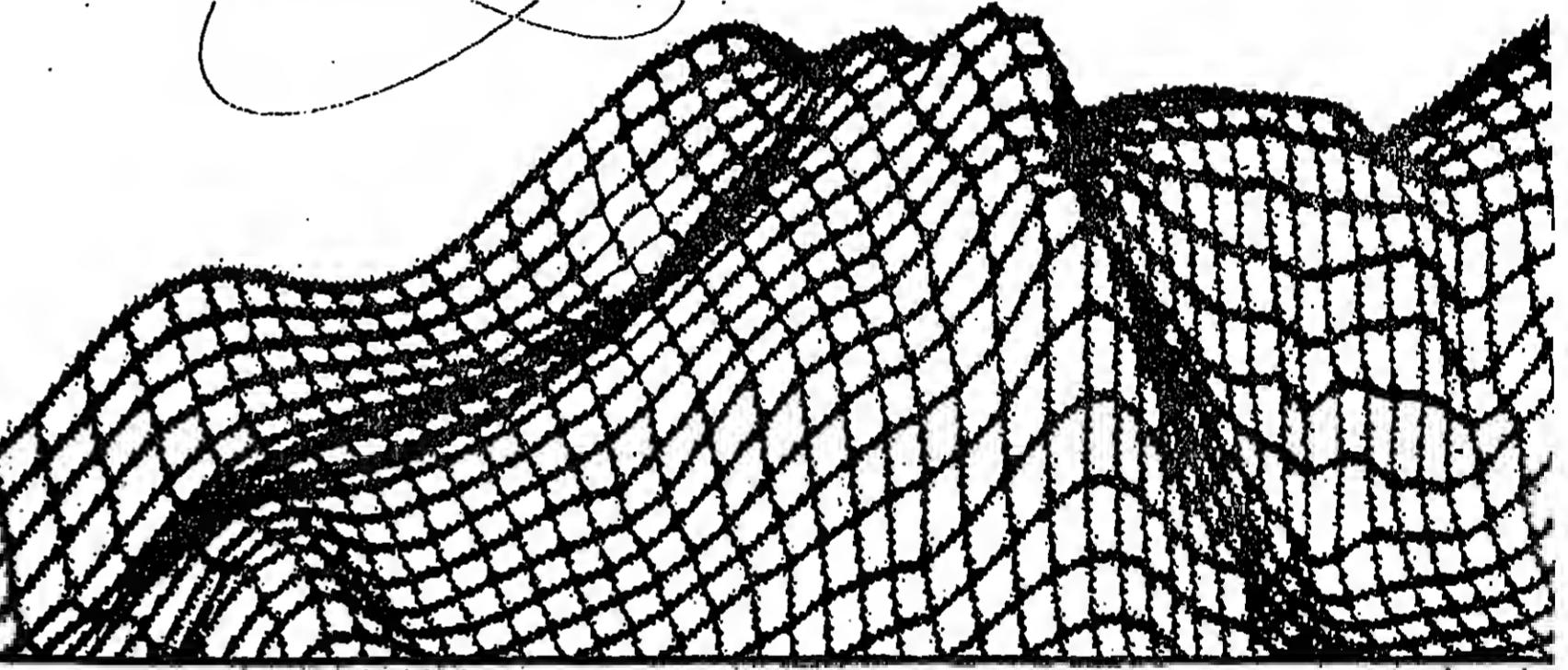
For several years now, results from superior breeding entries have been ensured in almost all the maize areas under state control. The state stimulus is the very high quantitative and qualitative growth of the entries.

As a matter of fact, the seed production is directly controlled by the research stations and stations within the network of the Academy of Agricultural and Silvicultural Sciences. The generalizations were simultaneous - breeding, selection, and hybrids of the future. For the maize of the future itself it is likely to be different from the one we have today.

For instance, the Romanian geneticists are interested in other "things" in the maize programme. They seek a better arrangement of the genes, and many favour the inbreeding of inhomogeneous lines. They also favour relatively small size plants, a 100-1000 grain size, for example, a great advantage for the farmer. In the long run, they even intend to introduce the recombinant gene into the maize. Superintensive maize, although so far the methods have not really clarified the objectives, could be increased within a few years by conventional methods, and biotechnological, with cells containing young plant tissue.

# ROMANIAN NEWS

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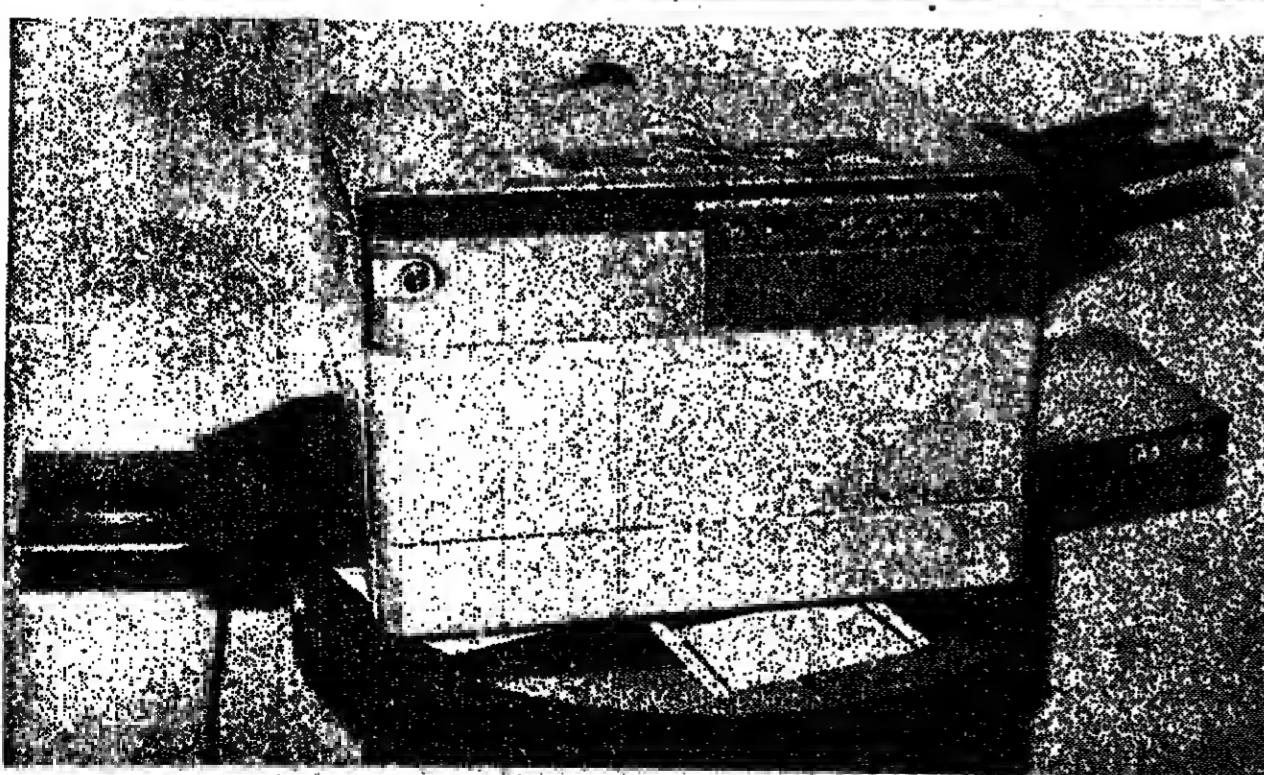
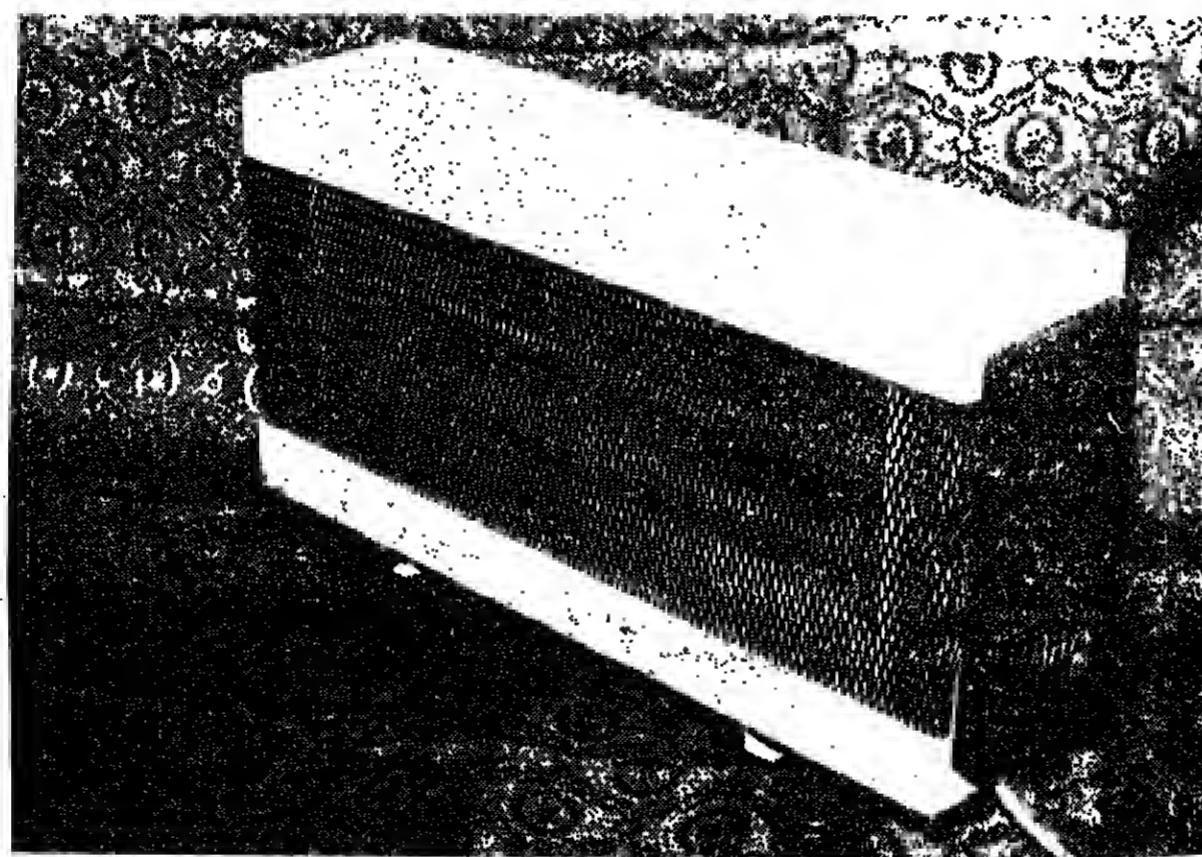
- plastic insulated copper wire electric conductors
- electric household appliances
- connecting elements



- heating elements in metallic tube
- high and low voltage electric apparatus
- audio and musical apparatus
- copying apparatus
- electronic cash registers
- equipment for the electrical engineering industry
- radio and tv aerials

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- C 112 ELECTROSTATIC COPYING MACHINE
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  - nominal power : 1.2 kw
  - copying speed : 12 A4-format copies per minute

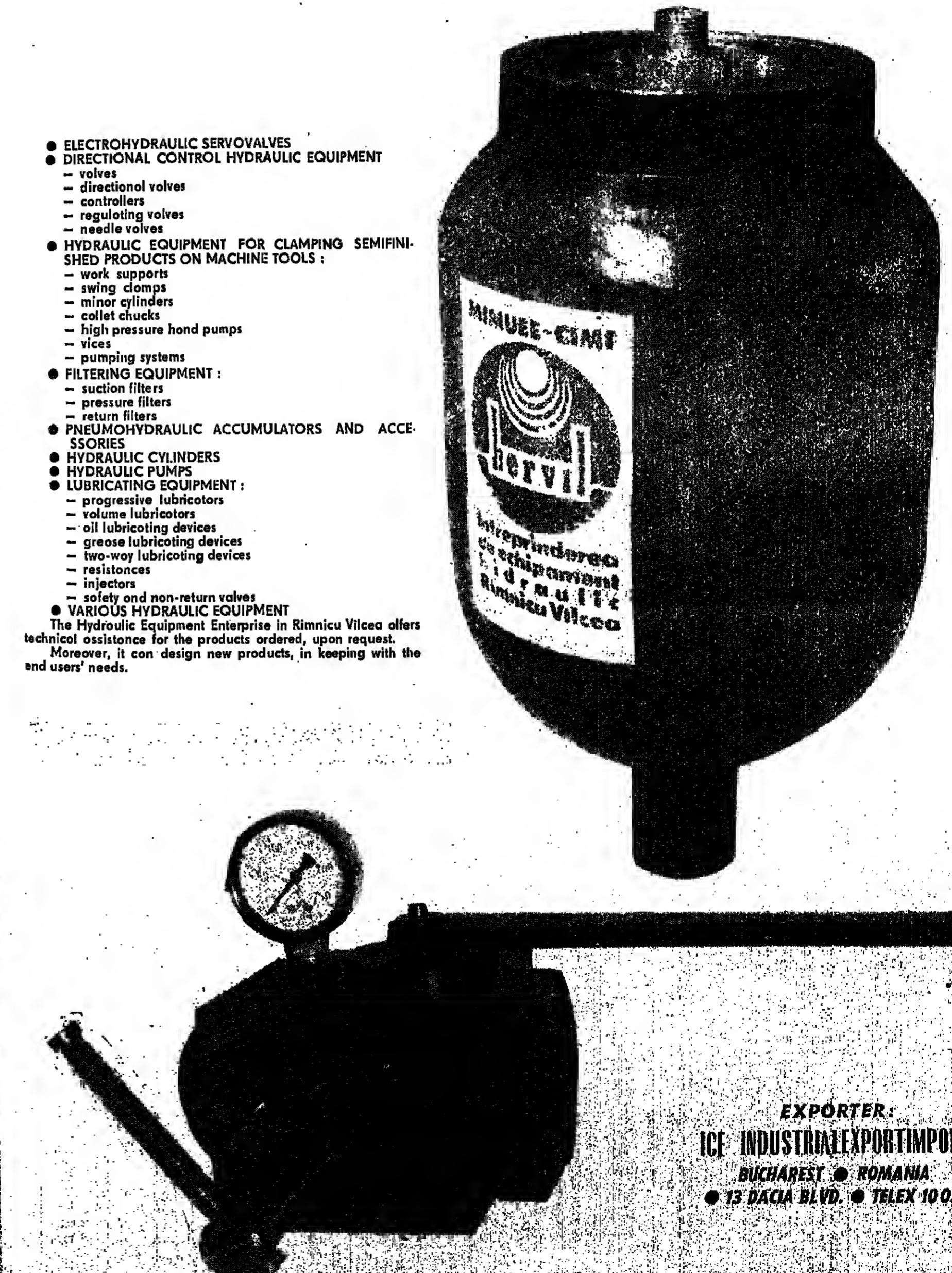
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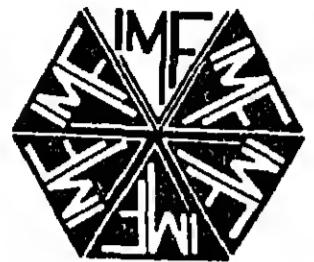
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  - directional valves
  - controllers
  - regulating valves
  - needle valves
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  - vices
  - pumping systems
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  - pressure filters
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  - oil lubricating devices
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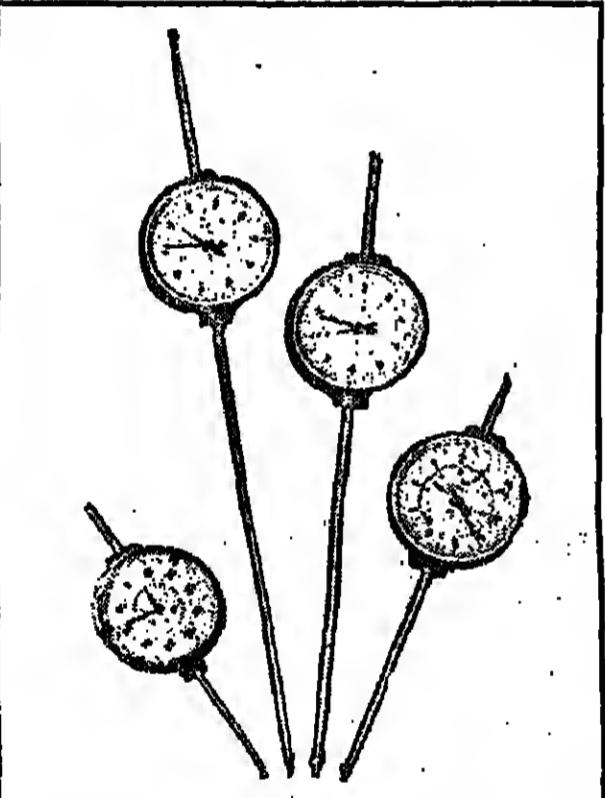
If, generally speaking, "man is the measure of all things" as Protagoras put it, we must stress that the quality of your products and the productivity of your labour are strictly conditioned by the use of MEASURING AND CONTROL APPARATUS.

The post- or in-process sizing of your products supplies you the information through which you can become EFFICIENT as a producer.

It is this efficiency (viz. quality, produc-

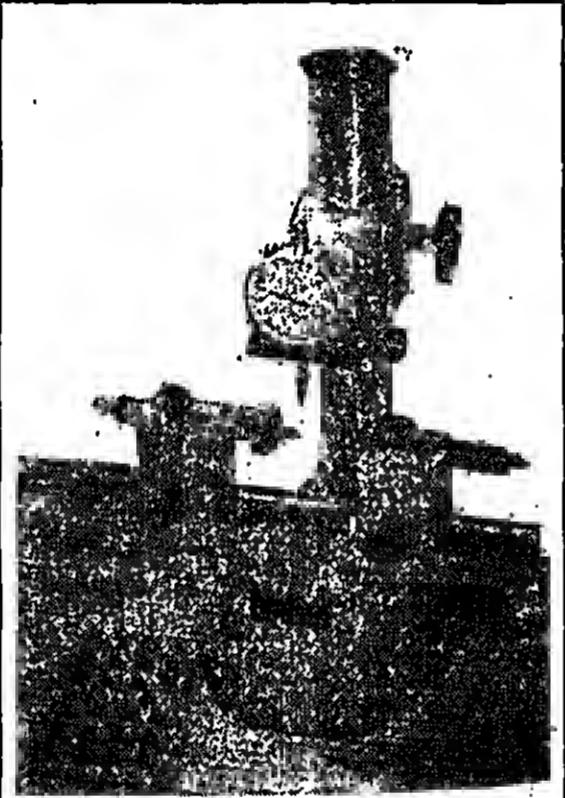
tivity, competitiveness) that the Fine Mechanics Enterprise (IMF) of Bucharest has in mind when offering its beneficiaries:

- measuring and control apparatus for lengths, pressures, temperatures, discharges, times and speeds;
- special tools (diamond and sinter-carbide metal tools), holders, high-accuracy and linearity devices and dies, having a high degree of productivity and durability.



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- circular dial shop gauges • gear pitch-error and gear-tooth-thickness measuring instruments • reading ball-gauges; optical read-out devices and rules.



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- in-process sizing gauge for continuous exterior cylinder surfaces with one and two measuring points • for continuous exterior surfaces and for continuous interior cylinder surfaces with two measuring points • in-process sizing gauge for centreless grinding machines • in-process sizing gauge for exterior diameters of narrow surfaces • copying systems mounted on machine tools for processing through copying after a pattern.



## AUTOMATION ELEMENTS AND MECHANISMS

- Programmers • electromechanical impulse counters • programme control for automatic washing machines • discharge counters with oval wheels • electromechanical tachographs for motor vehicles • complex speed measuring installations for locomotives and subways.

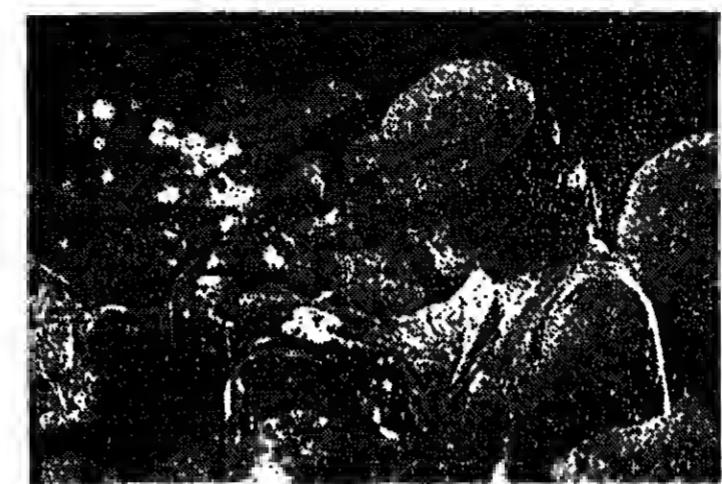
## FOR PRESSURE INDUSTRIAL CLOCK-TYPE APPARATUS, INSTALLATIONS AND TEMPERATURE CONTROL

This apparatus family includes pressure switches and thermostats. They are indispensable in the automation of starting and stopping installations using fluids, whose temperature and pressure must be maintained within certain preadjusted limits. Pressure switches and thermostats are made by the Fine Mechanics Enterprise in a wide variety according to the freezers and types of motors they are mounted on, and the conditions of the environment.

## REMEMBER THE



## IMF TRADEMARK



## SINTER-CARBIDE METAL PRODUCTS

The main groups of products bearing the "CARME-SIN" mark - which are the object of the Bucharest Fine Mechanics Enterprise's production programme - are the following: sinter-carbide metal brazable tips and inserts for metal cutting; sinter-carbide metal inserts specific to the wood industry, building materials and extraction industry; products for drilling installations; dies for screws and nuts; dies for ball bearings; other types of products upon the foreign partners' demand.

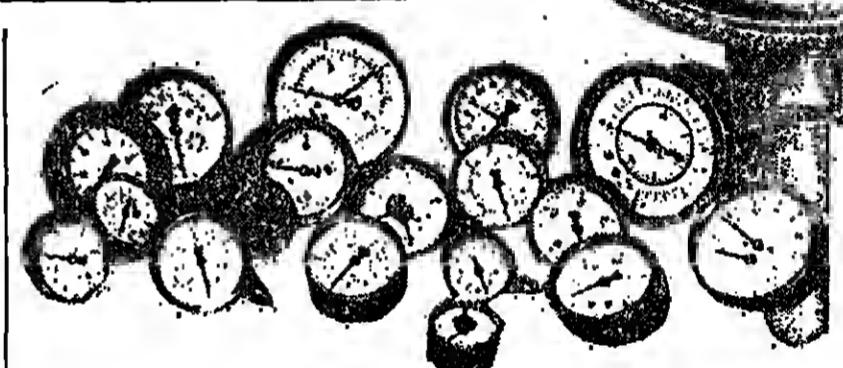
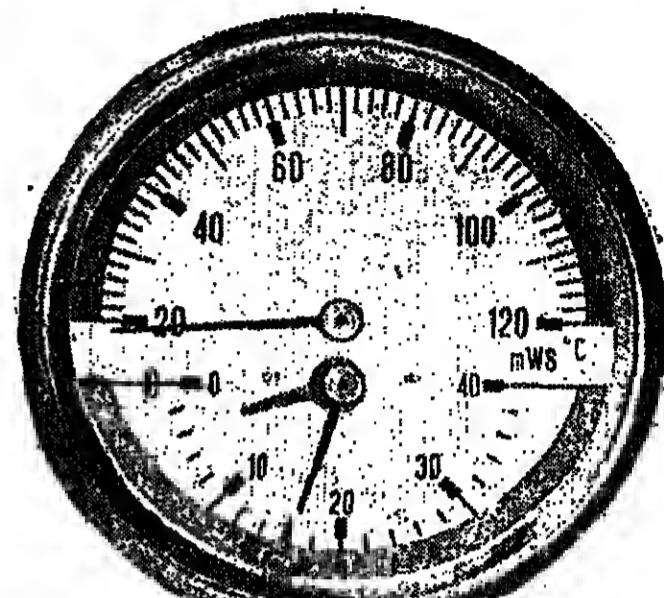
According to the concrete destination indicated by the end user, these products are executed out of the PKMG groups of carbide metal powder, after ISO international standards or according to other requirements specified in the order.

In order to increase the durability and performances of the sinter-carbide metal inserts, the method is applied of coating them with extra-hard layers of titanium carbide, giving the inserts an increased durability of up to 300 percent, as compared to the normal execution.



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- diamond mills with metallic or resinous binder of various shapes and sizes, with cubic boron nitride.
- diamond tools for construction-material processing
- diamond tools with galvanic binder
- honing diamond blades
- diamond posts
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- chambering tools with extra-hard materials from diamond polycrystals or cubic boron nitride
- diamond drawing dies.

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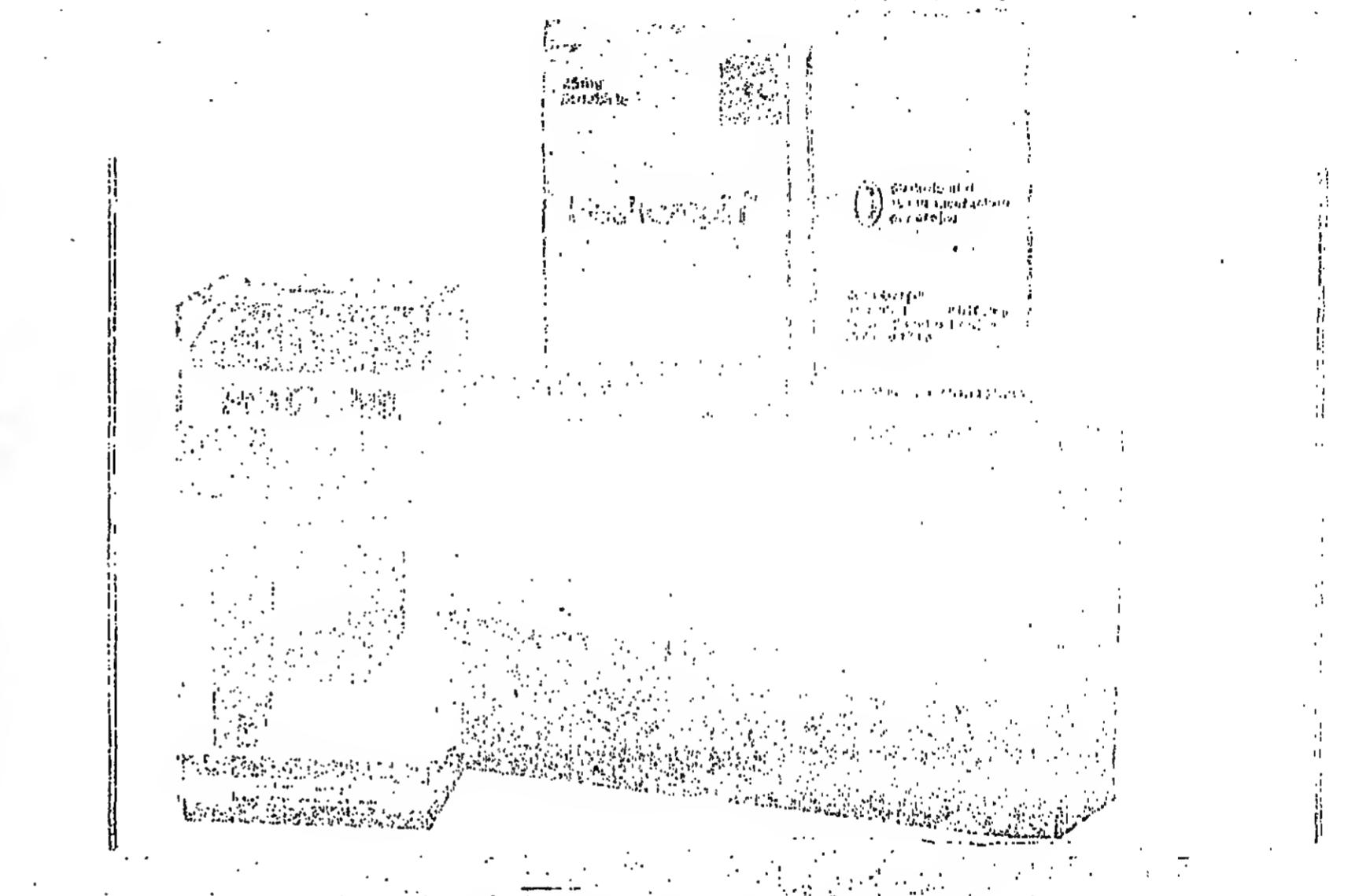
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- PH 15 15-storeyed hydraulic press
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- complex equipment for the pulp and paper industry

THROUGH ICE UZINEXPORTIMPORT BUCHAREST:

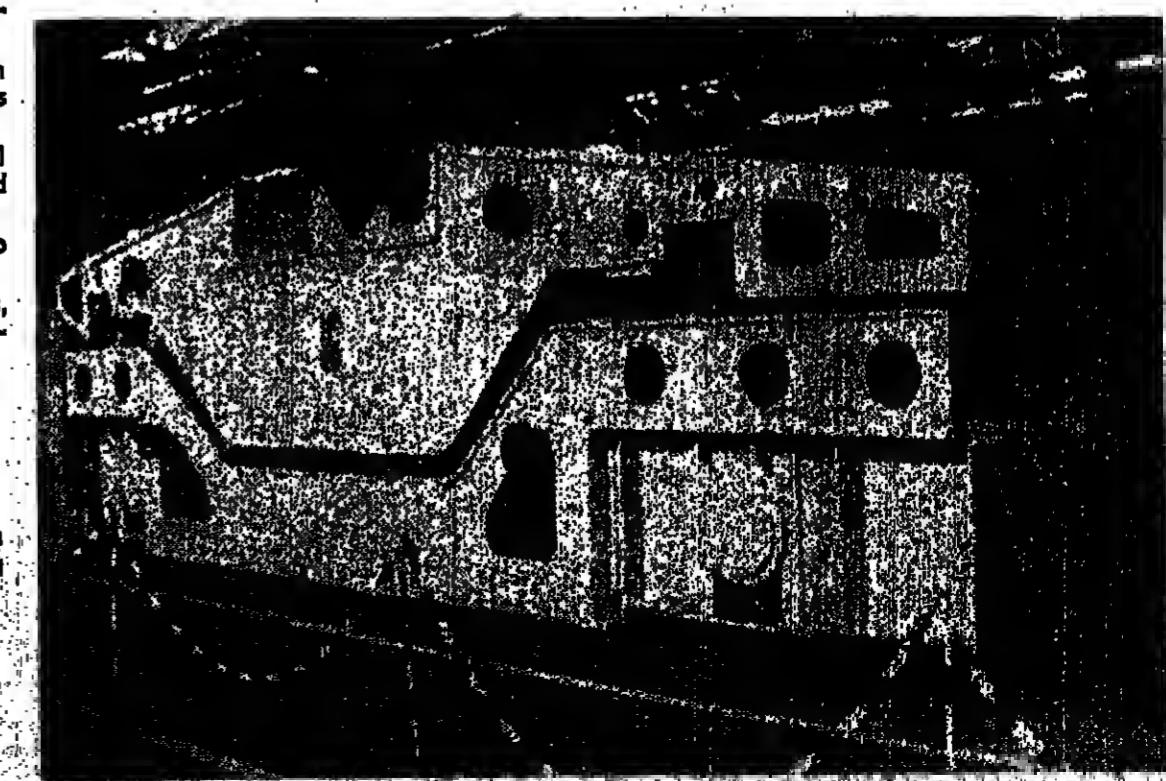
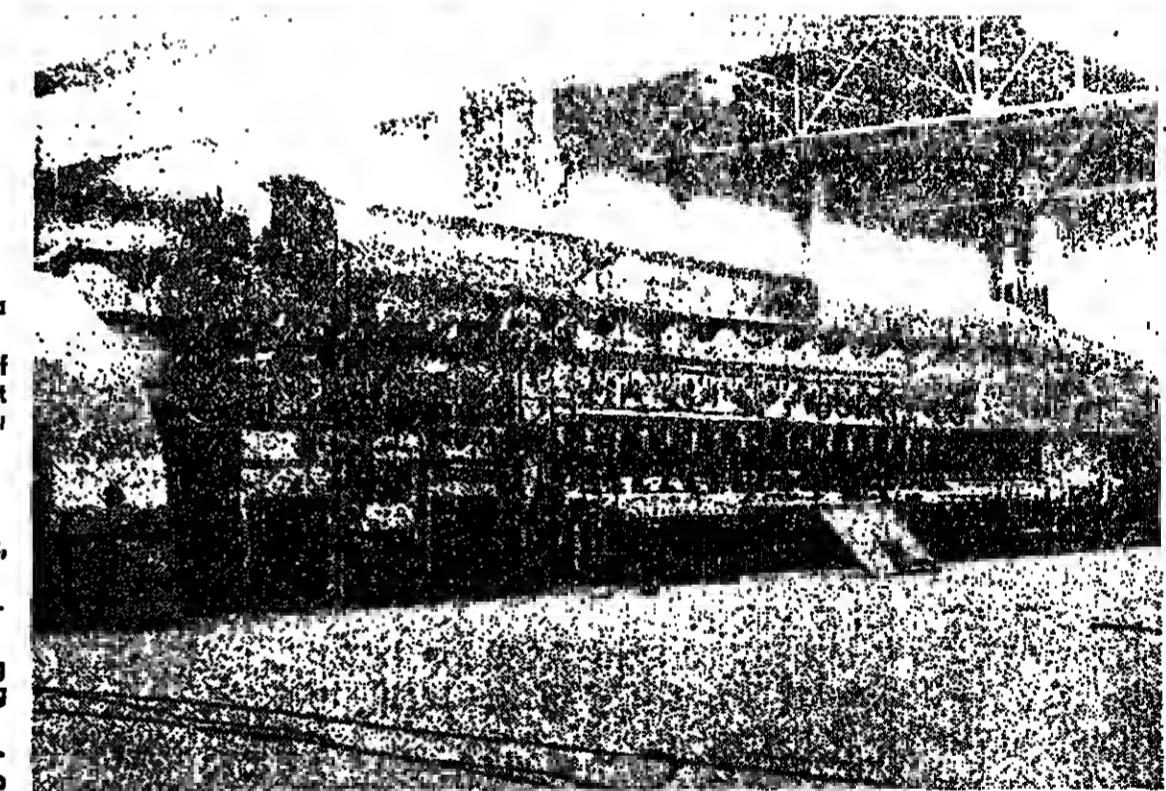
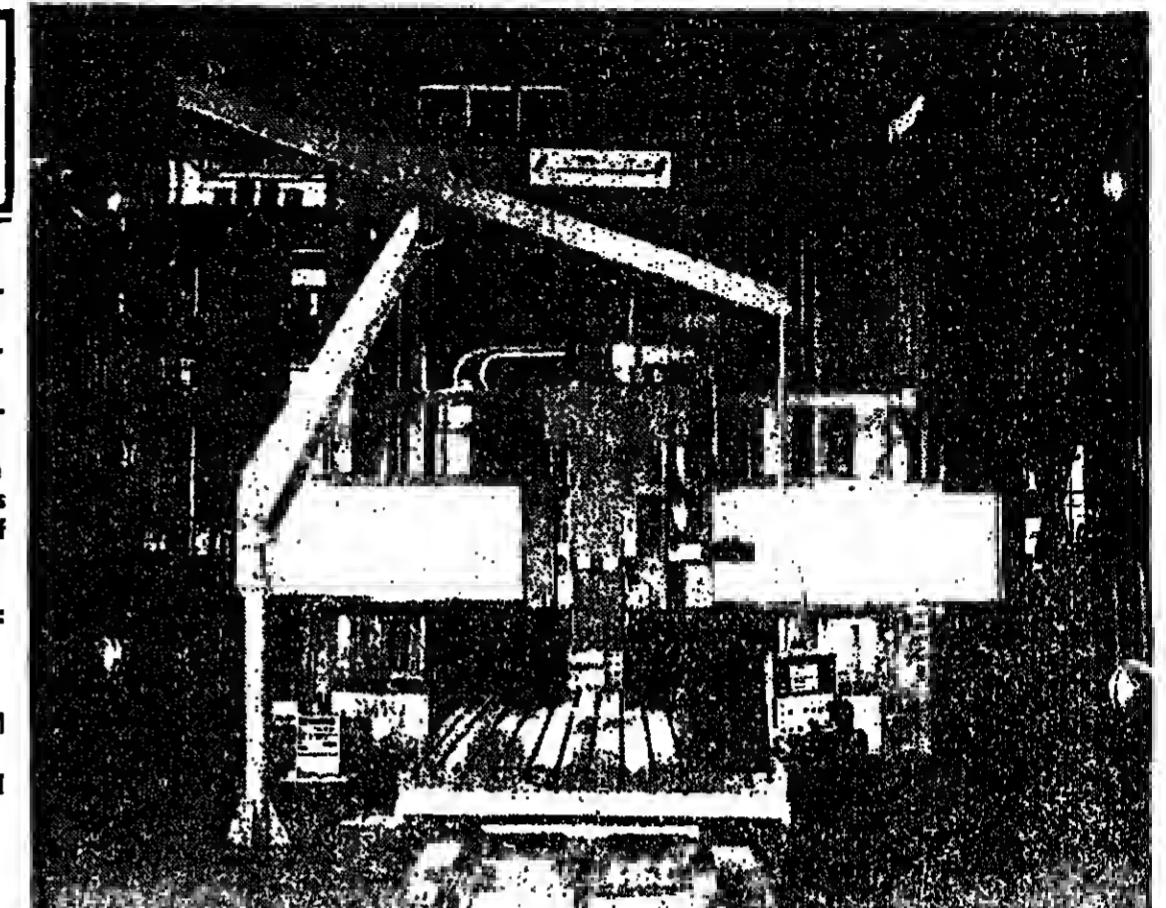
- complex technological equipment for the iron and steel industry

Upon request, the Heavy Equipment Enterprise of Craiova can manufacture special machines, equipment according to the end users' documentation and other performance works like:

- complex metal structures for machine-tools
- equipment for nuclear electric plants
- welded mechanical constructions up to 125 t/pc, including 80 mm thick sheet plates
- complete heavy reducers and products for metallurgy, ships, chemical, power industries, etc.
- spur gear or screw wheels with diameter ranging between 30 and 600 mm 1-30 modules (with generating milling cutters) and width to 2,000 mm
- straight bevel gear,  $d = 35 - 500$  mm,  $m = 1.5 - 12$  mm, and  $B_{max} = 72$  mm, pitch cone length up to 200 mm
- grinding spur gear or screw wheels,  $d = 25 - 1,000$  mm,  $m = 1.5 - 14$  mm, and  $B_{max} = 230$  mm
- plain turning of cylinders and drums with  $d = 2,500$  mm and  $L = 10,000$  mm for diameters less than 2,000 mm,  $L = 14,000$  mm can be obtained
- turnings, millings and broachings on vertical lathes for cylindrical parts with  $d = 8,000$  mm and  $L = 3,000$  mm
- slide, surface, grinding, etc. with widths up to 3,600 mm and lengths of 12,000 mm
- dynamic balancing of parts and subassemblies,  $G = 100 - 90,000$  kg,  $d = 50 - 5,000$  mm and  $L = 250 - 15,000$  mm
- stress relieving through vibration
- measuring through laser interferometers

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# MINOLTA GREETS ROMANIA

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## THE SECOND PHASE OF RAISING REMUNERATIONS

November 1 marked the beginning of the second stage of remuneration rises. The first beneficiaries of this increase are over 100,000 workers in the mining industry, electric power, metallurgy, machine building, electrical engineering, chemistry and petrochemistry, woodworking and building materials industries, light industry, drilling and geology, scientific research, technological development, design and informatics whose monthly tariff remunerations range between 2,000 and 2,250 lei.

During the following period, other categories of personnel will receive higher remunerations so that over 50 per cent of the working personnel will benefit by higher wages by the end of the year.

The beneficiaries of the second part of the phase will also be known as a result of the increase in the variable part of remuneration. This will be the outcome of the rise in the overall agreement surplus, length of service, benefit and other remuneration bonuses.

Let us also mention that, according to the law, the new stage of pay raising does not affect state civil service rights, housing rents and monthly credits and kindergartens fees.

According to legal provisions, remunerations will increase from 2,000-2,250 lei to 2,400-2,650 lei.

As we have already mentioned, during the first stage all monthly tariff remunerations under 2,000 lei were raised. As a result, inflation remuneration in the entire Romanian economy increased from 1,500 lei to 1,900 lei monthly.

## SCULPTURE CAMPS

Majova (Buzău county); Călărași, Mălini, Mureșani, Mecea, Iași (Arad county); Salilei (Bihor county); Sighet (Maramureș county); Sighetu Marmației (Maramureș county); Lăzăre (Harghita county); Arad (Arad county); Oradea (Bihor county); Buzău, Olănești (Buzău county); Bihadar (Constanța county); Chirpăr (Moldavia-Silvaniei county); Râșca (Hîrjaua county) are the localities where for about 20 years now the Fine Arts Union jointly with the local press has been organizing sculpture camps for young fine artists.

This year, the 13th of local fine artists holding this kind of camp have been enriched with a new centre — the tourism and recreation centre of Străulești (in Buzău).

The participants were: Vasile Cozmenescu, Andreea Marinescu, Marilou Hîrțan, Mihai Colțea, Radu Colțea, Gheorghe Mihăileanu, Adelina Popescu, etc. Their beautiful works cut in stone of Po-

## SCIENTIFIC COOPERATION

On the basis of a cooperation contract, the Agricultural Research Station of Lovrin and the Verner-Schindler Station of the GDR are studying together, in comparative culture, two types of potato-sugar-beet. The researchers of Lovrin also collaborate with the Clujine Institute of the USSR in problems of hemp, grain for fibres and seeds. They have granted technical assistance for the application of Romanian techniques in the USSR for obtaining large crops of soybean.

The results are displayed on a PMS-system colour tv or monitor screen.

TESS is one of the most recent products assimilated in production by Electrocomunications in Bucharest. The initials stand for fully automated Special Services Telephone System. Tess is computer-controlled and is fitted with a microprocessor-based central unit, software compatible with SIMULAIR-SPECTRUM, a colour display and a remote keyboard.

With the help of this automated system which allows of making calls on the order of a central unit, messages still calls or programmed calls can be repeated on the basis of a complex phone-book. Automated answers can be given in the absence of the subscriber, the message can be recorded, and data and programmes can be transmitted through the telephone line with the help of a telephone serial.

The data are displayed on a PMS-system colour tv or monitor screen.

Recently, Balonita enterprise in Sibiu was declared a model unit as part of the drive to update production in the field of fine mechanics. At present, the enterprise's manufacturing list includes two big groups of products — hydraulic equipment (over 1,000 types and sizes) and measuring and control apparatus (in about 300 varieties). Also manufactured in Sibiu are complex installations for machine tools and automation means for the nozzles power, mining, metallurgy and shipbuilding programmes, for irrigation and sewerage systems, etc. (Left photo).



According to the Institute of Meteorology and Hydrology in Bucharest, November temperatures in the southern and western regions of Romania will be normal and occasionally lower than usual. In the other areas temperatures will be slightly higher than the regular ones. Rainfall will be normal in the largest part of the territory, somewhat scarce in the north and centre and heavier in places in the southwest.

Cold weather during the first days of the month followed by gradual warming, sky overcast, rather overcast in the second part of the first decade. Rain and drizzle, briefly turning into sleet and snow. Snowfalls expected in the mountains. Minimum temperatures in the first ten days, ranging between -10 and -12°C, less than -10°C during the first night. Maximum temperatures: 5-15°C. Misty weather in the second decade, with rain and occasional snowfall, heavier in the southwest. Low, between -1 and +4°C, highs between 4 and 14°C.

Outlook generally cloudy in the last interval of the month. Rain and drizzle, more frequent during the last days. Sleet and snow in places. Min. temp. -2 to -1°C, max. 8-10°C.

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